
MASTER DRAINAGE PLANNING FOR LARGE SITE DEVELOPMENTS

Process and Requirement Guidelines

May 1995

■ *Text will be made available in Braille, large print, or audio tape, as requested.*

MASTER DRAINAGE PLANNING FOR LARGE SITE DEVELOPMENTS

Process and Requirement Guidelines

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
The MDP Process	i
Components of the MDP	ii
Post-Development Monitoring and Remediation	ii
MDP Monitoring Guidelines	ii
 I. INTRODUCTION	 1
 II. MASTER DRAINAGE PLAN GOALS AND OBJECTIVES	 2
MDP Goal Statement	2
MDP Objectives	2
 III. REGULATORY FRAMEWORK	 3
A. SURFACE WATER DESIGN MANUAL	3
B. SEPA PROCESS RELATIONSHIP	3
C. PERMIT APPROVAL PROCESS	4
D. MASTER DRAINAGE PLAN THRESHOLDS	6
Surface Water Design Manual Thresholds	6
Standard and Limited Monitoring Scopes	6
Variance	6

IV. MASTER DRAINAGE PLAN PROCESS AND COMPONENTS	8
A. MASTER DRAINAGE PLAN PROCESS	8
Step 1: Pre-Application Meeting	10
Step 2: Preliminary Application	10
Step 3: MDP and Baseline Studies Scoping	10
Step 4: Preliminary Draft MDP	11
Step 5: Draft MDP	12
Step 6: Recommended MDP	13
Step 7: Hearing Examiner Process	14
Step 8: MDP Finalization and DDES Engineering Plan Support	14
Step 9: Construction Monitoring	14
Step 10: Post-Construction Monitoring Plan Performance	14
B. COMPONENTS OF MASTER DRAINAGE PLANS	14
Drainage Plan	15
Hydrologic Model	15
Mitigation Measures	15
Post-Development Monitoring Plan	16
Agreements/Contracts/Scopes	16
Compliance with Regulations	16
Special Reports and Studies	16
Technical Report	16
C. MASTER DRAINAGE PLANS FOR URBAN PLANNED DEVELOPMENTS	16
Introduction	16
D. COMPONENTS OF MDP'S FOR UPD PERMITS	17
Step 1: Pre-Application Meeting	17
Step 2: Preliminary Application	17
Step 3: MDP and Baseline Studies Scoping	18
Step 4: Preliminary Draft MDP	18
Step 5: Draft MDP	19

D. COMPONENTS OF MDP'S FOR UPD PERMITS (continued)	
Step 6: Recommended MDP	20
Step 7: Hearing Examiner Process	20
Step 8: MDP Finalization and DDES Engineering Plan Support.....	20
Step 9: Construction Monitoring.....	20
Step 10: Post-Construction Monitoring Plan Performance	20
E. REVIEW OF SUBSEQUENT PERMIT APPLICATIONS	21
 V. THE POST-DEVELOPMENT MONITORING PROCESS	22
A. PURPOSE OF MONITORING	22
B. TYPES OF MONITORING	22
C. CONTENTS OF POST-DEVELOPMENT MONITORING PLAN	23

MASTER DRAINAGE PLANNING FOR LARGE SITE DEVELOPMENTS

Process and Requirement Guidelines

EXECUTIVE SUMMARY

The goal of the Master Drainage Plan (MDP) process is to facilitate comprehensive drainage planning for large land parcels in a manner that assures appropriate levels of resource protection. Further, King County seeks to increase efficiency by enhancing collaboration, encouraging cost-effectiveness and innovation, and resolving regulatory impediments.

These MDP Guidelines are provided as technical guidance to assist applicants in fulfilling the King County Surface Water Design Manual¹, Appendix B requirements, and other applicable codes and rules. King County staff also applies these guidelines in reviewing submittals and determining adequacy.

The MDP Process

The MDP process occurs within a larger development permit regulatory framework. It is tied to both the general permit review and State Environmental Policy Act (SEPA) processes administered by the Department of Development and Environmental Services (DDES). A ten-step MDP process is described in these guidelines, which fully integrates the MDP with these DDES requirements. The MDP process, particularly coordination between the applicant and King County, should be initiated before the permit application. It should continue through development and approval of the site-specific MDP, and culminate after implementation. Successful implementation is to be demonstrated through monitoring to verify achievement of the identified resource objectives. These guidelines describe more general drainage planning requirements for Urban Planned Development proposals than the more detailed requirements for subdivisions.

¹Surface Water Design Manual, Surface Water Management Division, Department of Public Works, King County, Washington, 1990.

Components of the MDP

The components of an MDP include technical elements to be approved by the assigned King County Division Manager, drainage controls and a monitoring plan that would be approved through the appropriate permit approval process, and supporting information and analysis that are part of the record but not subject to formal approval.

Technical elements include the drainage plan, the hydrological modeling, any variances to the SWDM, and agreements or contracts needed to implement the MDP. Supporting elements typically include documentation of compliance with regulations related to water resources, the technical report, and special reports and studies agreed to in the MDP scope.

Post-Development Monitoring and Remediation

Post-development monitoring is performed to determine whether the level of protection anticipated in the MDP actually occurs. The data collected are used to verify that facilities are installed and operating properly, and that impacts to resources are within acceptable limits disclosed in environmental documents. If problems are detected, minor remedial measures may be applied to improve performance of mitigation measures. Monitoring can provide feedback about the performance of mitigation measures to guide modification of County policy and regulations.

MDP Monitoring Guidelines

The site-specific nature of drainage planning is a key aspect of the MDP. It is this specificity that allows efficiencies in costs and resource protection to be realized. Technical guidelines are given in the Appendix that outline the level of detail for monitoring and studies typically needed for a successful MDP.

Often the level of detail needed for a drainage plan is dependent on the density and placement of development within the landscape. Generally, more detail is needed for higher density, higher risk developments, less for lower density, lower risk ones. The guidelines therefore identify two levels of monitoring: one, the standard monitoring scope, and the other, termed a limited monitoring scope, which is a less intensive level of monitoring for developments with lower densities or where more extensive resource protection measures are being proposed that result in low environmental risk.

I. INTRODUCTION

Surface water management requirements for proposed developments in King County are specified by the 1990 King County Surface Water Design Manual (SWDM). These requirements are fairly uniform and prescribed. Developers must carry out these requirements under specified conditions, unless a variance is obtained. For large sites, however, the SWDM specifies the Master Drainage Plan (MDP) process, which is an individualized process that tailors requirements to the specific characteristics of the land. The MDP sets the surface water management requirements for the proposed development area, but allows flexibility so that resource protection can be realized in the most economically efficient manner.

This document, "Master Drainage Planning for Large Site Developments, Process and Requirement Guidelines (MDP Guidelines)," has been developed to better realize both the economic and resource protection efficiencies possible in the MDP process. King County has drawn from experiences with previous drainage planning cases, incorporating known issues and needs into this conceptual approach.

The MDP Guidelines identify the goals and objectives of the MDP process, explain its regulatory context, and outline a ten-step MDP process for preparing and implementing the MDP that is integrated into the Department of Development and Environmental Services (DDES) permit review process. Information about the elements of each key step, including the submittal and review requirements, are given. The guidelines also define the formal components of the MDP and specify which technical elements are to be approved by the Division Manager or other applicable permit approval process, and those elements that are simply part of the MDP record.

The MDP Guidelines provide detail for the standard subdivision process but may be modified to accommodate commercial and grading permits and other land use processes. One modification is the Urban Planned Development process, which is discussed in Section IV.C. Other modifications include a Limited Scope MDP, as well as variance from the SWDM requirement for an MDP.

The Appendix provides detailed guidelines for site-specific monitoring, studies, and analysis—the foundation upon which the MDP is built—along with guidelines for post-development monitoring.

II. MASTER DRAINAGE PLAN GOALS AND OBJECTIVES

The following goal statement and objectives were developed to provide fundamental guidance in the process and its requirements.

MDP Goal Statement

An MDP should facilitate comprehensive drainage planning by encouraging large site development in a manner that assures appropriate levels of resource protection.² The planning process should be collaborative, encourage efficiency and cost-effective innovations, and resolve regulatory impediments.

MDP Objectives

- Capitalize on the expertise of staff, consultants, and applicants through a collaborative process.
- Provide incentives for efficiency and innovation, both in the process and in resource protection.
- Provide predictability in terms of time, cost, and outcome.
- Provide flexibility and efficiency in the development-planning process.
- Assure consistency with other King County programs.
- Integrate with overall King County regulatory process.
- Identify and suggest solutions to regulatory impediments, especially in the King County Code.
- Determine mitigation commensurate with risk of impacts, including project size and duration of development period.

²~~Appropriate resource protection is determined through a decision-making process that weighs environmental~~ protection against other social values and goals of the citizenry. Such determinations are established in basin plans, community plans, and other documents that have been considered and approved by the County Council. 1/5/00

III. REGULATORY FRAMEWORK

A. SURFACE WATER DESIGN MANUAL

Master Drainage Plans (MDPs) are currently required under the Surface Water Design Manual (SWDM) and King County Code (KCC) 9.04.050 for large site development proposals that meet the SWDM threshold requirements. The SWDM Special Requirements and Appendix B specify the objectives, criteria, and components of the MDP, although in general terms. The MDP is in accordance with the Department of Development and Environmental Services (DDES) permitting process and general SWDM design standards.

These MDP Guidelines are provided as technical guidance to assist applicants in fulfilling the SWDM, Appendix B requirements and other applicable codes and rules. King County staff also apply these guidelines in reviewing submittals and determining adequacy.

B. SEPA PROCESS RELATIONSHIP

The purpose of the State Environmental Policy Act (SEPA) is to disclose the potential environmental impacts of the proposal, to compare them with those of the alternatives, and to establish mitigation measures to reduce impacts to acceptable levels. The SEPA process addresses a wide range of environmental impacts, including surface water impacts, although more generally than the MDP.

The MDP process comprehensively examines the site and development proposal and identifies potential surface water impacts and resource issues. It results in a specific, approved drainage plan designed to mitigate identified impacts, and is the basis for a detailed engineering plan following preliminary plat approval. Studies and analyses are necessary to develop the drainage plan. The MDP process works most efficiently if the SEPA and MDP processes proceed in parallel. This is for two reasons: first, it avoids duplication of effort in drainage-related studies and analyses; and second, it allows impacts determined in the Environmental Impact Statement (EIS) process to be addressed in the MDP, and likewise allows the MDP investigations to provide input to the SEPA review. It would be possible for the MDP development to precede the EIS; however, additional MDP work may be needed to address any impacts disclosed later through the EIS. If the EIS were to precede the MDP, later MDP work may disclose additional environmental impacts that potentially could require further environmental review in a supplemental EIS or an addendum.

C. PERMIT APPROVAL PROCESS

An MDP is a part of a permit application filed with DDES. Its development is closely coordinated with the permit review and the SEPA processes (see Figure 1.). The MDP process follows the submittal of a development application and preliminary site plan.

The Final MDP approval occurs as a part of the formal permit approval. Note that certain technical MDP components require Division Manager approval. Other elements are formally recommended as conditions of the land use permit (see Section IV.B.). For Urban Planned Developments (UPDs) and subdivision permit approvals, permits are approved by the Hearing Examiner and Council process. For commercial and grading permits, they are granted by administrative approval processes. In all cases, MDPs are to be completed and recommended to the applicable permit decision authority following the completion of the Final EIS.

D. MASTER DRAINAGE PLAN THRESHOLDSSurface Water Design Manual Thresholds

Currently, an MDP is required if a proposed project meets the conditions listed below. Drainage planning for developments which fall below these thresholds is guided by the SEPA process and requirements of the SWDM. An MDP is currently required if a project:

- a) is an Urban Planned Development (UPD) (formerly termed a Master Planned Development (MPD)) as described in an adopted Community Plan; OR
- b) is a subdivision or Planned Unit Development (PUD) that will eventually have more than 100 single-family residential units and encompasses a contiguous drainage subbasin of more than 200 acres; OR
- c) is a commercial building permit or PUD that will eventually construct more than 50 acres of impervious surface; OR
- d) will clear an area of more than 500 acres within a contiguous drainage subbasin.

In the future, these thresholds may be modified to include other conditions, such as sole source aquifers.

Standard and Limited Monitoring Scopes

Often the level of detail needed for a drainage plan is dependent on the density and placement of development within the site. More detail is needed for higher density, higher risk developments, less for lower density, lower risk ones. The baseline monitoring guidelines (see Appendix), therefore, identify two levels of monitoring: one, the standard monitoring scope, and the other, termed a limited monitoring scope, which is a less intensive level of monitoring for developments with lower densities or risks, or more extensive resource protection measures. Typical resource protection measures that result in lower environmental risk can include forest retention, wider than required buffers, covered parking, or landscaping integrating stormwater infiltration and treatment measures.

Variance

A variance to the SWDM requirement for an MDP may be requested. The applicant shall complete the scoping process, and if it can be demonstrated that the project impacts can be mitigated using standard design methods as outlined in the Design Manual, then the Division Manager may approve a variance from the MDP requirement or a limited scope MDP.

Criteria that would be considered include, but are not limited to, the following. The project site:

- is hydrologically simple in existing and in developed conditions;
- has infiltrative soils;
- is adjacent to major receiving water bodies;
- is not located at headwaters and drains to less than multiple subbasins;
- has no demonstrated downstream impacts;
- has no sensitive areas on-site requiring special protection; and
- has no impact to regionally or locally sensitive resource areas.

IV. MASTER DRAINAGE PLAN PROCESS AND COMPONENTS

This section describes the stages of the Master Drainage Plan (MDP) process for typical subdivisions within the context of the Department of Development and Environmental Services (DDES) permit process. For building and grading permits, the steps would be modified. The first Subsection, A. Master Drainage Plan Process, describes a ten-step process to develop an MDP, and the following subsection, B. Components of Master Drainage Plans, defines the components of a completed MDP.

A. MASTER DRAINAGE PLAN PROCESS

The recommended sequence of events to develop the MDP for a standard subdivision plat is described in the following ten steps (see Figure 2.). (For Urban Planned Developments, see Subsection C.)

- | | |
|----------|---|
| Step 1: | Pre-Application Meeting ³ |
| Step 2: | Preliminary Application |
| Step 3: | MDP and Baseline Studies Scoping |
| Step 4: | Preliminary Draft MDP |
| Step 5: | Draft MDP |
| Step 6: | Recommended MDP |
| Step 7: | Hearing Examiner Process |
| Step 8: | MDP Finalization and DDES Engineering Support |
| Step 9: | Construction Monitoring |
| Step 10: | Post-Development Monitoring |

Early planning is important to establish a good project plan and to ensure mutual understanding of the applicant and County staff needs and expectations. This occurs during the first three steps through pre-application and preliminary application meetings and scoping. The MDP is then developed in the next three steps: the Preliminary Draft, Draft, and then Recommended MDP. The process allows flexibility to refine the MDP as the development proposal changes and evolves through the permitting process, and as a result of the collaborative efforts of the applicant's consultants and County staff. The objectives of the early planning and consecutive MDP development concepts are to both optimize the surface water drainage plan and to make the MDP process most efficient.

³Recommended

Section IV

Master Drainage Plan Process and Components

This recommended process may be adjusted to accommodate particular circumstances of a given project. If an applicant wishes to propose changes, they should be presented to the County for consideration in the early stages of the MDP development (pre-application, preliminary application, and scoping stages).

Applicants should notify the County as soon as they determine that an MDP is expected to be developed for a given project, so the County may schedule staff and plan resources to provide timely review services. Estimated durations for review of products will be established during the preliminary application phase, so both the applicants and the County can manage the project efficiently. A project schedule can be determined and agreed to at the preliminary application stage.

Step 1: Pre-Application Meeting

A pre-application meeting is recommended to examine conceptual development alternatives for the project, which recognize sensitive features of the site. The meetings should include staff representing the following agencies (or their successors): DDES Land Use Services, Building Services, and Environmental Divisions, and the SWM Division Drainage Investigation and Regulation and Basin Planning Units.

Step 2: Preliminary Application

Two efforts should occur during the preliminary application stage. An MDP project management plan should be established, and site characteristics and drainage plan concepts should be evaluated. The management plan discussion should address the MDP review process, billing, schedule, and the general needs and expectations of both the applicant and the County. The preliminary site plan should allow site features, critical surface water resource issues, and drainage facility concepts to be evaluated and discussed.

Submittals⁴ needed for the meeting include:

- Site plan, which includes a preliminary lot layout with topography and road circulation
- Level 1 downstream drainage analysis
- Environmental checklist

⁴Submitted to DDES as part of the preliminary application

Step 3: MDP and Baseline Studies Scoping

General: The baseline monitoring and MDP scopes should be prepared by the applicant following the MDP Guidelines for Monitoring and Studies (Appendix). The County will review and discuss initial concepts with the applicant during the scoping phase. Depending both on the sensitivities of site and basin resources and on characteristics of the proposed development, the scoping process will identify whether the standard scope of studies and monitoring, or a limited scope should be pursued. Resource protection measures that result in low environmental risk, such as significant areas of forest retention, wide buffers or setbacks along streams, lakes, and wetlands, or clustered development, may result in the ability to pursue limited monitoring and studies for certain resources. The post-development monitoring element will be considered in conjunction with baseline monitoring scoping, but the draft post-development monitoring plan will not be requested until the Draft MDP stage.

Submittals needed for the scoping phase include:

- Topographic map
- Land constraint map which overlays the site plan identifying approximate extent and locations of the sensitive areas and zoning constraints. Use field inspection and aerials to approximate delineations. Buffer requirements should reflect Sensitive Areas Ordinance and other regulatory requirements.
- Listing of codes applicable by vesting
- Hydrologic modeling method proposed. (The baseline monitoring scope will depend upon the modeling method selected.)
- Preliminary fisheries assessment

Step 4: Preliminary Draft MDP

The Preliminary Draft is the first submittal of the MDP. Most studies and analyses should be substantially complete at this stage; however, some more complex or longer duration aspects of the MDP may not be completed by this stage. The following are needed in a Preliminary Draft MDP:

Geotechnical

- Site cross sections with stratigraphy
- Soils map with U.S. Natural Resource Conservation Service (formerly Soil Conservation Service) soils delineation
- Test pit and/or boring logs with location maps showing exploration location
- Surficial geology map and information
- Stream study reaches with transects
- Preliminary information on piezometer readings or monitoring well information
- Off-site analysis regarding stream morphology and geology (stream walk notes or description of stream systems)
- Preliminary information on infiltration feasibility location of proposed infiltration facilities
- Proposed mitigation measures

Section IV

Master Drainage Plan Process and Components

Engineering

- Conceptual drainage plan
- Conceptual grading plan for major cuts and fills (greater than 6 feet in height)

Engineering (continued)

- List of applicable codes, compliance issues, and variances
- Floodplain studies
- Drainage facility type, performance, and design standards
- Level 2 and Level 3 off-site analysis, where requested
- Land use constraints. (Refined Level 2 and full analysis of data may not be available until Step 5: Draft MDP.)
- Proposed mitigation measures

Fisheries

- Level I, Level II, and Level III fisheries assessment, if applicable. This is a step-wise process and could be finished in the Draft MDP phase, if needed.
- Proposed mitigation measures

Water Quality

- Analyses of water quality conditions and potential impacts
- All baseline monitoring necessary to support the above analysis
- Proposed mitigation measures

Step 5: Draft MDP

The Draft MDP step is a refinement of the Preliminary Draft, based on review comments and incorporation of elements incomplete in the Preliminary Draft. A first submittal of the post-development monitoring plan should also be submitted during this phase.

Submittals needed are:

Geotechnical

- Additional information collected to date on existing conditions
- Proposed draft post-development monitoring scope
- Preliminary grading volumes
- Temporary Erosion and Sediment Control Plan mitigation measures
- Refined Level III off-site analysis regarding stream morphology and geology, where applicable
- Sediment budget for surface water leaving site

Engineering

- Design standards for regional and drainage conveyance systems (if appropriate)
- Conceptual conveyance plan showing routing of on-site flows
- Completed preliminary sizing of drainage facilities (retention/detention and infiltration), delineation of tract boundaries for drainage facilities, and specified design and performance standards

Section IV

Master Drainage Plan Process and Components

- Proposed construction mitigation measures identified
- Specific drainage variance issues should be identified and described

Engineering (continued)

- Code compliance section listing applicable regulations
- Complete off-site analysis specifying on-site mitigations and downstream improvements, if applicable

Hydrology

- Field monitoring data required as input to the hydrologic model for existing conditions should be finalized.
- Existing conditions modeling and post-development modeling should be completed for hydrology where applied for flow duration and flow volume impact assessment
- Drainage subbasins with identified critical resources may require pre-development modeling. Calibrated Hydrologic Simulation Program-Fortran (HSPF) modeling may be requested. (See Appendix.)

Note: Resource protection measures formally proposed by the applicant in combination with regional analysis data previously available may be substituted for modeling information needs at the Draft MDP stage and potentially simplify the modeling approach.

Fisheries

- Refine proposed fisheries mitigations.
- Identify uncertainty in potential impacts and relate to post-development monitoring.

Water Quality

- Proposed mitigations for water quality should be finalized.
- Identify uncertainty in potential impacts and relate to post-development monitoring.

Step 6: Recommended MDP

At this step, the recommended MDP would be complete, according to the requirements of the SWDM, these guidelines, and other applicable codes and would be recommended by the DDES Director (or his or her designee) for formal approval as part of the permit decision. It should include all revisions responding to review comments and resolutions of previously outstanding issues, incorporate Final EIS mitigation measures, and address applicable DDES and Technical Committee requests.

Additional submittals needed include:

- Complete post-development flow analysis where applied for water level fluctuation and flood analyses
- All water quality monitoring data should be complete and analyzed, along with quality assurance/quality control and data validation.*

Section IV

Master Drainage Plan Process and Components

** Except those parameters specified in the Appendix, I.B.4.*

Step 7: Hearing Examiner Process

For subdivisions, the DDES Director (or his or her designee) would submit MDP findings and recommendations to the Hearing Examiner/County Council for consideration, as part of the preliminary permit approval process. County staff representation would be made available for testimony at the hearing. For commercial or grading permits, the Division Manager would approve the MDP prior to the administrative permit approval.

Step 8: MDP Finalization and DDES Engineering Plan Support

After the Hearing Examiner and Council (or administrative permit approval) process, the MDP would be modified as necessary to comply with permit conditions. This step would also allow incorporation of HSPF modeling results for retention/detention sizing and rate control and completion of the specific agreements on the post-development monitoring plan. The ordinance for the permit should state that the applicant would amend the MDP to be in accordance with the conditions of preliminary approval.

Step 9: Construction Monitoring

Construction monitoring is performed by DDES to ensure that good construction controls are implemented and the Temporary Erosion and Sediment Control (TESC) Plan is followed.

Step 10: Post-Construction Monitoring Plan Performance

The detailed post-development monitoring plan should be approved at the time the engineering plan is approved. This approval includes the schedule and components of monitoring, project budget, agreement/contracts, and bond/sureties (if applicable). At the completion of these components, the responsibilities of King County and the applicant are defined for the course of the plan performance.

B. COMPONENTS OF MASTER DRAINAGE PLANS

The following components are submittal elements of the MDP. The Division Manager will approve the drainage plan, HSPF modeling, and any variances needed. The Division Manager will also approve agreements, contracts, and scopes that support the MDP development. Upon completion, the Division Manager would recommend approval to the permit decision authority (Hearing Examiner, if for Urban Planned Developments or subdivision plats) stating that the MDP has been completed in accordance with the Surface Water Design Manual and King County Code 9.04, and noting any special permit approval conditions or outstanding issues to be considered in approving the MDP. The decision authority would then consider and approve the MDP with modifications or conditions.

The following components are part of the MDP, but the elements of each will be tailored to the

Section IV

Master Drainage Plan Process and Components

individual MDP during the scoping and review processes:

- Drainage plan⁵
- Agreements/contracts/scopes associated with the MDP⁵
- Surface Water Design Manual variances⁵
- Hydrologic model (methodology, calibration, and design runs)⁵
- Mitigation⁶
- Post-development monitoring plan⁶
- Compliance with regulation
- Special reports and studies
- Technical report

Drainage Plan

The contents of the drainage plan include: site plan components, topography, natural features, sensitive areas, buffers, lot layout, road right-of-way, drainage subbasin boundaries, drainage pathways, road and lot drainage conveyance routing, drainage easements, drainage facility locations, facility types, design standards, facility outfalls, and constructed mitigation measures.

Hydrologic Model

The submittal will be agreed to and defined by the baseline monitoring studies scope and MDP scope. Based on a menu approach identified in the Appendix, the hydrologic model will be determined. For HSPF, the site will be reviewed in the context of scoping guidelines in the Appendix, Attachment 1.

Mitigation Measures

Mitigation measures for drainage systems that the applicant proposes should be identified. The MDP will identify any remaining impacts and suggest methods to reduce them, including an estimate of the resultant reduction. Final mitigation measures recommended by the DDES Technical Committee and not agreed to by the applicant will be recommended as conditions of the permit approval, so that the permit decision authority can weigh all the mitigations that may be imposed upon an applicant and make an equitable judgment based on all impacts caused by the project and costs or other considerations.

⁵Components of MDP requiring Division Manager approval

⁶Components of MDPs to be recommended for approval by the appropriate decision authority

Section IV

Master Drainage Plan Process and Components

Post-Development Monitoring Plan

The general scope of the post-development monitoring plan is to be adopted as a condition of permit approval through the Hearing Examiner or commercial or grading permit process. A detailed plan is to be approved by the Division Manager prior to engineering plan approval. (See Appendix for monitoring guidelines.)

Agreements/Contracts/Scopes

Any agreements that result from the preliminary application phase and the work scopes for baseline monitoring, the MDP content, and post-development monitoring would be approved by the Division Manager.

Compliance with Regulations

The applicant is to provide a list of regulations that require compliance and discuss all proposed variances. This is part of the record, but need not be approved.

Special Reports and Studies

Special reports may be requested as part of the scoping process. Studies are agreed to as part of the scoping process. They must be in sufficient detail to determine likely impacts of the project. Studies will not be formally approved, but are part of the MDP record.

Technical Report

The report shall provide a comprehensive analysis of existing and proposed on-site and off-site drainage systems (both natural and manmade) and contain any necessary technical data. The technical report would include, but not be limited to, off-site analyses, floodplain analyses, and any special analyses, if applicable.

C. MASTER DRAINAGE PLANS FOR URBAN PLANNED DEVELOPMENTS

Introduction

Subsection B. described the ten-step process for preparing MDPs for subdivision plats. This section describes modifications to the ten-step process for Urban Planned Developments (UPDs), when plat approvals are not applied for simultaneously with the UPD. A UPD permit gives approval of an overall site plan, project phasing, development standards to be applied to all future development on the site, and project-specific conditions to mitigate impacts on the environment and public facilities and services. It identifies the particular locations, uses, and range of densities of development; however, it does not identify individual residential lots, internal streets, or other improvements or provide approvals for specific building or road construction or grading.

The UPD permit becomes the mechanism for standardized and consolidated review to implement

Section IV

Master Drainage Plan Process and Components

the subsequent development of the UPD, and establishes conditions to be complied with by all subsequent land use approvals implementing the UPD. Thus, general requirements necessary to mitigate impacts related to surface water management would be included within the UPD permit conditions of approval, which would apply to each subsequent development permit within the UPD.

Because the UPD permit authorizes a general site plan for which future development approvals must be sought for specific development activity on the site, the SEPA and MDP process for the UPD follows a phased-review approach. (See Subsection E.)

D. COMPONENTS OF MDP'S FOR UPD PERMITS

The MDP for a UPD would generally follow the ten-step process described for MDPs in Figure 2. Under phased review, many of the specific requirements of the ten-step process may be deferred to review of the subsequent development permit application. The exception to this would be when one or more preliminary plat applications are submitted with the overall UPD permit application. The following is a summary comparing the ten-step process for the regular MDP process and the MDP process for UPD permit approvals (excluding concurrent submittal of plats).

Step 1: Pre-Application Meeting

Similar to the process for subdivision plat MDPs, a pre-application meeting is recommended for UPD approvals to examine conceptual development alternatives for the project.

Step 2: Preliminary Application

This step includes establishment of an MDP project management plan and evaluation of site characteristics and drainage plan concepts. Submittals would be the same as for a plat, except the site plan would not need to provide a detailed lot layout. The site plan should show locations of sensitive areas and buffers, required open spaces, UPD perimeter buffers, location and range of densities for residential development, location and size of non-residential development, and the general drainage system configuration (flowlines for the "backbone" of the drainage system to determine diversions and discharge points, but not sizing). Detailed site design and analysis would occur at the implementing plat stage. Exceptions to this could occur where proposed constructed drainage systems affect the feasibility of the UPD proposal.

Step 3: MDP and Baseline Studies Scoping

This step is essentially the same as in Subsection B.

Step 4: Preliminary Draft MDP

Step 4 for the MDP process for UPD approval varies as follows:

Conceptual Drainage Plan

The conceptual drainage plan component of the MDP for the UPD approval should include the following: topography; natural features; sensitive area buffers; drainage subbasin boundaries; existing drainage pathways; major facility locations and types, and approximate area required; facility design standards as codified or proposed; and a description of the "backbone" (major conveyances and facilities) of the drainage system, major proposed drainage pathways, including the general vicinity of proposed outfalls into natural drainages and connections to off-site drainage systems. This is needed to determine potential impacts to resources, the relationship of the proposal to the natural drainage flow of the site, and to assess the overall feasibility of the UPD approval. Information on grading of development areas would typically be conceptual in nature. Conceptual sizing of the retention/detention and treatment facilities would be needed at this time; however, specific information such as conveyance sizing of the facilities that feed into the backbone would not be needed.

The conceptual drainage plan should also include information on major road conveyance routing, their drainage facilities' locations, and outfalls to existing systems. Minor systems would be described at the level of system performance and routing of flows, but would not be required to provide engineering plan detail at the UPD permit review stage.

Surface Water Design Manual Variances

It is anticipated that variances necessary for project level feasibility would be identified by the applicant during King County review of the UPD approval. These would be considered and approved as part of the UPD Master Drainage Plan and would not be processed under a separate variance process. For UPD level design, conceptual variances may be needed for review related to some Core and Special requirements, as they would apply to specified subbasins. Sufficient detail must be provided to prove feasibility and justify all variances.

Drainage Facility Type, Performance, and Design Standards

Drainage facilities typically would not be fully designed or located as part of a UPD permit application. Therefore, plat-specific design locations and sizing, and individual facility impacts would not be provided. Locations of major facilities and potential points of discharge to sensitive areas would be identified, as well as facility types and codified or proposed design standards.

Mitigation Measures

Mitigation measures provided for the MDP for the UPD approval would likely be more general, similar to basin plan subbasin requirements, rather than design-level specifications. Mitigation also may be limited to descriptions of future studies and modeling required to take place under later plat, commercial, or grading permit development applications, in cases where mitigation decisions associated with those later applications will not cause substantial modification or major revisions to the UPD proposed action.

Step 5: Draft MDP

The Draft MDP is a refinement of the Preliminary Draft, based on review comments and incorporation of elements incomplete at the Preliminary Draft. Because the UPD does not identify individual residential lots, internal streets, or other improvements or provide approvals for specific building or road construction or grading, a number of the data requirements listed for regular MDPs do not apply to UPD permit approvals. These include: detailed preliminary grading volumes; preliminary sizing of plat or commercial site drainage facilities (retention/ detention and infiltration); specific mitigation measures for the Temporary Erosion and Sediment Control Plan addressing construction water quality. However, the general locations, rough quantities, and areal extent of alterations should be described. General mitigation measures and surface water design standards that will apply to all future permit submittals would be refined during this step. The level of detail must be adequate to assess the impacts and justify the mitigations of the UPD on resources both on-site and off-site, with attention to downstream property owners and resources.

Drainage standards that would typically be established during this step include:

1. Impervious surface (assumptions and range of limitations)
2. Clearing limitations (as determined through basin plans)
3. Release rates per subbasin
4. Retention/detention versus infiltration
5. Water quality facility types (standards for treatment and water quality protection)
6. Critical resources: All Known and Reasonable Treatments (AKARTs), water quality (identify critical resources and establish percentage removal for water quality)
7. Wetland buffers and water level fluctuation
8. Direct wetland impacts, proposed alterations to wetlands (not at the plat level)
9. Outlet modifications

Step 6: Recommended MDP

The recommended MDP for the UPD permit application would be essentially the same process as described in Subsection B. The recommended MDP should include all revisions responding to review comments and resolutions of previously outstanding issues, incorporate Final EIS mitigation measures, and address applicable DDES and Technical Committee requests.

Post-development flow analysis or post-development modeling would be included in the recommended MDP in cases where the scoping process has previously determined this is necessary.

Section IV

Master Drainage Plan Process and Components

Step 7: Hearing Examiner Process

The Hearing Examiner process for the UPD permit application would be essentially the same process as for other MDPs.

Step 8: MDP Finalization and DDES Engineering Plan Support

Similar to other MDPs, the MDP for the UPD approval would be modified as necessary to comply with permit conditions. HSPF modeling for plat or commercial site drainage facility sizing and rate control may be incorporated into the Final MDP if the applicant chooses, but generally would not be required. For applications where revision of the MDP is expected, it is recommended that final review for engineering design purposes be deferred to engineering plan review.

Step 9: Construction Monitoring

Specific requirements regarding construction monitoring may be deferred to the plat phase to implement the UPD. The UPD approval would, however, include generalized conditions for construction monitoring to be applied for all subsequent development permit approvals within the UPD.

Step 10: Post-Construction Monitoring Plan Performance

Similar to Step 9, specific requirements regarding post-construction monitoring may be deferred to the plat phase to implement the UPD. The goals and objectives and major elements of post-construction monitoring to be detailed and implemented at later stages of the project would be determined during the UPD approval stage.

E. REVIEW OF SUBSEQUENT PERMIT APPLICATIONS

After the UPD permit approval, development applications for land use approvals implementing the UPD would be submitted and would follow the appropriate review processes. At these subsequent permit stages, the UPD site undergoes more detailed SEPA and MDP reviews as necessary.

Each subsequent development application or project phase would undergo additional SEPA and MDP screening. Additional information and analysis would be submitted to screen the application or phase. Any additional documentation and/or study needed would also depend on the UPD conditions of approval, which specify what future studies need to be performed for subsequent development applications. In general, should any revisions or addendums to the MDP for subsequent permit applications be required, they would proceed according to Subsection B. Of course, in certain situations, one or more steps would be reduced or simplified, since revisions would generally address only the subbasins affected by the land permit actions being permitted. Any addendum to the MDP would also contain the conditions identified in the UPD approval.

V. THE POST-DEVELOPMENT MONITORING PROCESS

A. PURPOSE OF MONITORING

The purpose of post-development monitoring is to determine whether the level of protection anticipated in the Master Drainage Plan (MDP) usually occurs. It is especially suited to address uncertainty, when potential impacts may only be qualitatively estimated and the magnitude of impact is unknown. It allows minor remediations and adjustments to improve performance of mitigation measures.

The data collected are used to verify that facilities are installed and operating properly and that impacts to resources are within acceptable limits disclosed in environmental documentation. If problems are detected by monitoring, remedial measures identified during the monitoring program design may be implemented. These remedial measures might include maintenance upgrades, adjustments to stormwater drainage facilities and systems, or additional preventive best management practices (BMPs). In addition to tracking the efficacy of mitigation measures, post-development monitoring can be a useful tool for decreasing uncertainty with respect to resource management issues and potentially allowing for future modification of County policy and regulations.

B. TYPES OF MONITORING

There are four basic types of monitoring which occur during the development cycle, from construction to occupancy and for a limited period of time thereafter:

- Construction monitoring
- Implementation monitoring
- Facility performance monitoring
- Resource monitoring

Construction monitoring ensures that BMPs are followed during the construction process, and that any problems arising are identified and resolved. Implementation monitoring is a simple step to determine if the mitigation measures and designs in the MDP are carried out as planned. Construction monitoring and implementation monitoring are routinely conducted by the Department of Development and Environmental Services (DDES). Facility performance monitoring evaluates the performance of stormwater management facilities. Resource monitoring examines impacts to significant resources, specifically whether the complement of land use prescriptions, site design, BMPs, and other site-specific mitigation measures identified in the MDP have the expected resource outcome. These types of monitoring, particularly the latter two, are discussed in further detail in Appendix, Section IV of the MDP Guidelines.

C. CONTENTS OF POST-DEVELOPMENT MONITORING PLAN

A strategy for post-development monitoring can be individualized for each MDP during the review process. The monitoring plan may be proposed by the applicant subject to approval by the County, or the plan may be proposed by the County. Similarly, the monitoring may be conducted by either the applicant or the County, or by consultants that are mutually agreed upon.

Post-development monitoring is particularly appropriate when the resources in question are of ecological importance, such as a question concerning plant community diversity in Class I wetlands. Secondly, it is important when there is a significant degree of uncertainty about the prospective impacts to the resource from the project. Third, there should be one or more remedial actions that are identified in advance which, if implemented, would address the parameters of concern.

The post-development monitoring plan should include monitoring elements, a schedule, reporting, and review elements within the scope of work. Typically, annual reports would be prepared and a final report should be submitted at the culmination of each phase of post-development monitoring.

Decisions about monitoring would be based on the guidelines provided in the Appendix and would be made as part of the MDP review process. Typically, the post-development monitoring plan would not be finalized until after the Hearing Examiner/Council process. A process to allow periodic review and modification of particular monitoring activities should be included in the final plan.